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Kyeong Keol Ryu; Talpasanu, A.; Mooney, V.J., III; Davis, J.A.;

Advanced System Integrated Circuits 2004. Proceedings of 2004 IEEE Asia-Pacific Conference on
4-5 Aug. 2004 Page(s):176 - 179

Digital Object Identifier 10.1109/APASIC.2004.1349441

[AbstractPlus](#) | Full Text: [PDF\(432 KB\)](#) [IEEE CNF](#)**IEEE CNF** IEE Conference Proceeding**IEEE STD** IEEE Standard 2. **IEEE standard for a simple 32-bit backplane bus: NuBus**

ANSI/IEEE Std 1196-1987

8 Aug. 1988

[AbstractPlus](#) | Full Text: [PDF\(4340 KB\)](#) [IEEE STD](#) 3. **The fiber-optic high-speed data bus for a new generation of military aircraft**

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Volume 2, Issue 1, Feb. 1991 Page(s):36 - 45

Digital Object Identifier 10.1109/73.80439

[AbstractPlus](#) | Full Text: [PDF\(1132 KB\)](#) [IEEE JNL](#) 4. **Optical passive bus for broadband user-network interface**

Iguchi, K.; Amemiya, S.; Soejima, T.; Murano, K.;

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Yao Li; Lohmann, A.W.; Pan, Z.G.; Rao, S.B.; Redmond, I.; Ting Wang;

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8. **A New Phase-Locked Oscillator Adaptable to Input Signals with Periodical Phase Jumps**

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10. **Reduced switching delay in wavelength division multiplexed two-dimensional multiple-plane optical Interconnections using multiple-wavelength VCSEL arrays**

Leight, J.E.; Willner, A.E.;
Lightwave Technology, Journal of
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Leight, J.E., Willner, A.E.

Dept. of Electr. Eng. Syst., Univ. of Southern California, Los Angeles, CA, USA;

This paper appears in: Lightwave Technology, Journal of

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Abstract

We calculate the expected number of internodal hops for a network established with a wavelength division multiplexed (WDM) two-dimensional (2-D) multiple-plane optical interconnection. This WDM optical interconnection incorporates WDM pixels consisting of multiwavelength vertical-cavity surface-emitting laser (VCSEL) arrays and wavelength-selective detectors. The WDM interconnection can support simultaneous and reconfigurable communication among a network of nodes. Using the expected number of hops as a measure of internodal switching delay, we show that the integration of WDM into the interconnection results in a significantly reduced delay as compared to single-wavelength systems. Substantial delay reduction results even when the number of wavelengths is small relative to the number of 2-D planes. We analyze the bus, dual-bus, and ring architectures since they define the means of communication between pixels. For each architecture, we analyze three configurations which provide each node access to (i) an entire plane of pixels, (ii) a row (or column) of pixels, or (iii) an individual pixel. When each network node has access to an entire plane of pixels, the proposed WDM interconnection incurs substantially shorter delay than single-wavelength optical interconnections. By allowing a node to access an entire row or column of pixels, the interconnection benefits from the incorporation of spatial division multiplexing (SDM) and the number of nodes connected can grow substantially, with negligible added delay. Finally, when a node can access only a single pixel, a large number of independent processors can be interconnected exhibiting far less switching delay than other electronic or optical interconnections of comparable size

Index Terms
Inspec

Controlled Indexing

computer networks laser cavity resonators optical fibre subscriber loops optical interconnections photonic switching
systems semiconductor lasers surface emitting lasers wavelength division multiplexing

Non-controlled Indexing

2D multiple-plane optical interconnection WDM WDM optical interconnection WDM pixels delay reduction
individual pixel internodal hops intermodal switching delay multiple-wavelength VCSEL arrays multiple-wavelength

vertical-cavity surface-emitting laser arrays. optical interconnections reduced switching delay ring architectures

single-wavelength optical interconnections single-wavelength systems spatial division multiplexing wavelength

division-multiplexed two-dimensional multiple-plane optical interconnections wavelength-selective detectors

Author Keywords

Not Available

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